

# Stakeholder Web-Based Interrogable Federated Toolkit (SWIFT), Phase II

Completed Technology Project (2017 - 2020)



## Project Introduction

There are three innovations in this proposed SWIFT project, all of which were identified during earlier effort. The first innovation involves the development of a web-accessible model invocation engine (the "Web-based" part of SWIFT) which was prototyped earlier, demonstrated to NASA/Ames in December 2016, and will be fully developed in the current proposed project. This model invocation engine can be used as a front end to SMART-NAS and can potentially transform NAS simulations into a Software as a Service (SaaS) model. This transformation will make it practical for NAS analyses to be run anywhere, and its design is compatible with the Data Distribution System (DDS) engine inside of SMART-NAS as well as with the Sherlock database system maintained by NASA. The second innovation, which is coupled with the first, is a standard modeling language, which we call the Predictive Query Language, or PQL (the "Interrogable" part of SWIFT). PQL is a powerful language for coordinating model runs across the distributed SMART-NAS environment, or any other model-based infrastructure. The final innovation involves developing applications ("app") that run on both Apple IOS and Google Android smart phones that enable commercial pilots to easily access the status of the NAS (the "Stakeholder" part of SWIFT). This app can access the current state stored in SMART-NAS or any other NAS data repository.

## Anticipated Benefits

NASA applications include the following: As an interface to NASA's SMART-NAS system, SWIFT provides a "Software as a Service" (SaaS) model, the first of its kind, to the aviation community. NASA can offer its various tools (ACES, FACET, Sherlock and others) as a service that is accessible through SWIFT and connected through SMART-NAS. As an engine that connects to a database such as the NASA-developed Sherlock system, SWIFT can access that data to configure fast-time and real-time models that can make future projections. These future projections can be stored back into the database (if needed) and become accessible to other NASA analysts. As a stand-alone analysis engine, SWIFT can be used by NASA and non-NASA government employees to refine a study question (through PQL statements) and to execute the resulting analysis using the federated toolkit attached to the SWIFT web-based interface. As a tool to express analyses in standard format, NASA and other government researchers can use PQL statements, in a stand-alone mode, to specify research questions that can be shared with other researchers in a clear, easy-to-understand language that is compilable to actionable requests for aviation simulations. As a language that transcends aviation applications, PQL can be used for any projection of the future state of any system, including planetary systems, cosmological investigations, projections of the spread of disease, and so forth. The potential non-NASA applications are isomorphic to the NASA applications except with a commercial intent. The SWIFT interface and IAI's government off-the-shelf federated toolkit can be used by aviation consultants, industry analysts, and other firms investigating one-off or



Stakeholder Web-Based Interrogable Federated Toolkit (SWIFT), Phase II Briefing Chart Image

## Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	2
Organizational Responsibility	2
Project Management	2
Project Transitions	3
Images	3
Technology Maturity (TRL)	3
Target Destinations	3

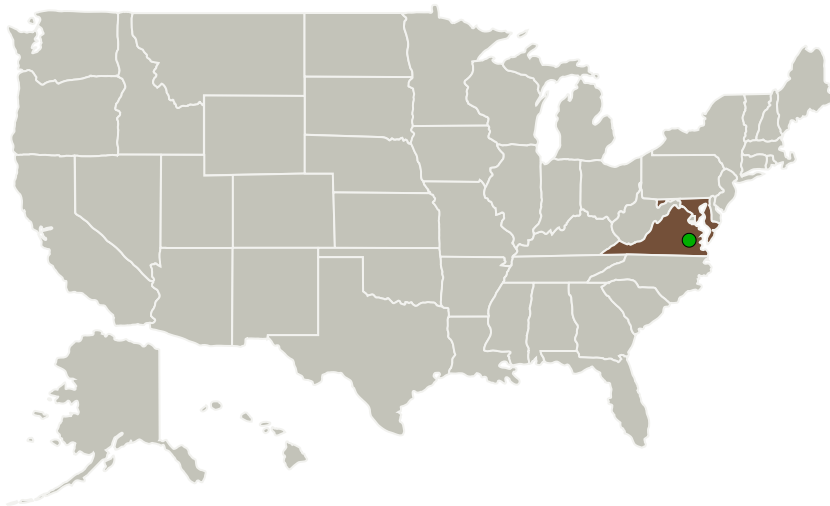
Stakeholder Web-Based Interrogable Federated Toolkit (SWIFT),  
Phase II

Completed Technology Project (2017 - 2020)



multiple problems in aviation analysis. Example questions might be "If NextGen is configured to use performance-based navigation (PBN) approaches at [name an airport such as Miami International], what will be the effect on noise for the surrounding population?" Such a question would be formulated as a PQL statement, which would require precise specification of the metrics involved and the configuration of the simulation tools (traffic, weather, PBN routes). The smart phone pilot app can be used to plan a pilot's work day, allowing the pilot to access all available information about the airports of interest.. The PQL statements can be expanded to include non-aviation applications, such as applications in medicine, earthquake prediction, other scientific areas, and sociological projections.

## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Intelligent Automation, Inc.	Lead Organization	Industry	Rockville, Maryland
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

## Primary U.S. Work Locations

Maryland	Virginia
----------	----------

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Intelligent Automation, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Project Managers:**Keith L Woodman  
Patricia C Glaab**Principal Investigator:**

Renato Levy

# Stakeholder Web-Based Interrogable Federated Toolkit (SWIFT), Phase II

Completed Technology Project (2017 - 2020)



## Project Transitions

**April 2017:** Project Start

**June 2020:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138690>)

## Images



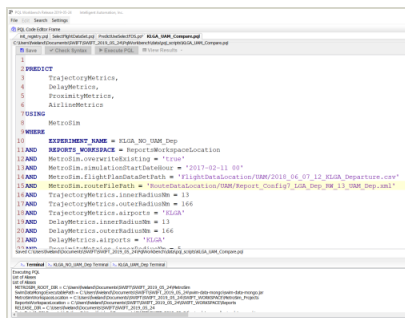
### Briefing Chart Image

Stakeholder Web-Based Interrogable Federated Toolkit (SWIFT), Phase II Briefing Chart Image  
(<https://techport.nasa.gov/image/129156>)



### Final Summary Chart Image

Stakeholder Web-Based Interrogable Federated Toolkit (SWIFT), Phase II  
(<https://techport.nasa.gov/image/132926>)

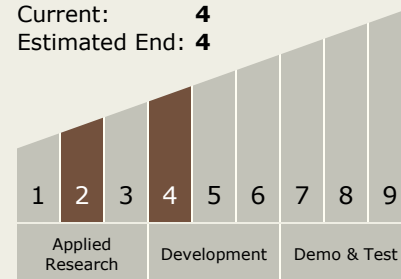


### Final Summary Chart Image

Stakeholder Web-Based Interrogable Federated Toolkit (SWIFT), Phase II  
(<https://techport.nasa.gov/image/126996>)

## Technology Maturity (TRL)

Start: **2**  
Current: **4**  
Estimated End: **4**



## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System